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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/627,962	07/28/2003	Olli Piirainen	59643.00281	2270
32294 7590 08/07/2007 SQUIRE, SANDERS & DEMPSEY L.L.P. 14TH FLOOR 8000 TOWERS CRESCENT TYSONS CORNER, VA 22182			EXAMINER LEE, SIU M	
			ART UNIT 2611	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/627,962	Applicant(s) PIIRAINEN ET AL.	
	Examiner Siu M. Lee	Art Unit 2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 May 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 8-12 and 15-18 is/are rejected.
- 7) ☒ Claim(s) 6, 7, 13 and 14 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 May 2007 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Remarks

1. Applicant's remark, see page 8, filed 4/20/2007, with respect to objection of the drawing have been fully considered and are persuasive. The objection of the drawings has been withdrawn.
2. Applicant's remarks, see page 9-16, filed 4/20/2007, with respect to the rejections of claims 1-5, 8-12, and 15-16 under 35 U.S.C. 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Hunton (US 7,095,798 B2).

Drawings

3. The drawings are objected to because

(1) Regarding figure 2:

According to page 11, paragraph 0056, line 6, the label "22a" should be corrected to "122a".

(2) Regarding to figure 3:

According to page 9, paragraph 0050, line 2, the label "101" in figure 3 should be corrected to "102".

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended

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replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

4. The disclosure is objected to because of the following informalities:

In Paragraph 0050, line 2, the label 300 is a signal line. In paragraph 0062, lines 1-5, the label 300 is corresponds to a block similar to block 400 in figure 4 that generates the residual signal.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

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5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1-5, 8-12, 15, 17, 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hunton (US 7,095,798 B2).

(1) Regarding claims 1, 8, 15, 17, and 18:

Hunton discloses a communication system comprising:

a transmitting apparatus configured to reduce a peak-to-mean ratio of a multi-carrier signal (the present invention provides a multi-carrier communication system employing a signal-peak suppression unit prior to D/A converter and radio frequency up converting modulator, column 10, lines 21-27);

generating a residual signal from a multi-carrier signal, the residual signal representing a difference between the multi-carrier signal and a hard-clipped multicarrier signal (figure 2 discloses a multi-carrier transmitter with a signal-peak suppression unit 110; the peak reduction calculation circuit in the correlation signal path calculates a peak reduction correction based on the input signal S and a signal peak limiting constant L, column 5, lines 52-55; a algorithm processor 140 calculates a complex correction vector C (residual signal) based on each sample of S and the signal peak limiting constant L, column 5, lines 55-65); and

combining the minimized residual signal and the multicarrier signal (combiner 130 in figure 3, combiner 130 combined the filtered correction signal V_F with a time-delayed version of the input complex signal stream S , column 6, lines 7-9).

Hunton fails to explicitly disclose applying a least squares function to the residual signal for at least one carrier of the multi-carrier signal, thereby generating a minimized residual signal for the at least one carrier.

However, Hunton discloses using a plurality of correction filters (correction filter 170 in figure 3) to distribute the burden of peak power suppression to each allocated transmit band (column 7, lines 31-50). According to the instant application, the purpose of the least square function to the residual signal is to find the best fit for the hard-clipper residual signal for each carrier such that the frequency constraints for each carrier frequency are fulfilled and is generated by the complex filters 106a to 106d respectively. The clipper filters are specially designed for each carrier so that each carrier has the same frequency characteristics as the transmitted signal (paragraph 0059-0060 of the instant application). Even though Hunton fails to disclose the least square function, the function of the correction filters 170 is actually functional equivalence to the least square function of the instant application.

It is desirable to applying a least squares function to the residual signal for at least one carrier of the multi-carrier signal, thereby generating a minimized residual signal for the at least one carrier (distribute the burden of peak power suppression to each allocated transmit band) because it can prevent excessive suppression of signal peaks and prevent the bandwidth correction signal exceeding the government allocated

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bandwidth (column 7, lines 31-50). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to employ the correction filters as disclosed by Hunton to constrain the bandwidth of the correction signal to within the allocated bandwidth.

(2) Regarding claims 2 and 9:

Hunton discloses that prior to the combining the minimized residual signals, filtering at least one minimized residual signal (a plurality of correction filter 170 filtered the residual signal, column 7, lines 31-52).

(3) Regarding claims 3 and 10:

Hunton discloses that delaying the multicarrier signal, wherein the delayed multicarrier signal is combined with the minimized residual signal (the multicarrier signal is delayed by delay 120 in figure 3 before combined with the minimized residual signal, column 6, lines 7-9).

(4) Regarding claims 4 and 11:

Hunton discloses wherein the generating the residual signal includes clipping the multicarrier signal to a predetermined level to thereby generate the hard-clipped multicarrier signal (the output of the switch 150 represents the difference between the input signal stream S and a version of S hard limited to the amplitude L, column 5, lines 45-65).

(5) Regarding claim 5 and 12:

Hunton discloses wherein the filtering comprises complex filtering (as the input signal stream S ($S=A+jB$ as disclose in figure 3) is a complex signal, the filtering perform by the correction filter 170 is complex filtering, column 3, lines 35-42).

7. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hunton (US 7,085,798 B2) as applied to claim 15 above, and further in view of Wright et al. (US 7,061,990 B2).

Hunton discloses all the subject matter as discussed in claim 15 that can be used in wireless communication system including cellular communication system, personal communication system, wireless local loop system and all other like system; except explicitly disclose the generating unit, applying unit and combining unit are implemented in a GSM EDGE mobile communication system.

However, Wright et al. discloses a wireless communication system including an Enhanced Data GSM system (column 1, lines 30-35).

It is desirable to implement the system in a GSM EDGE communication system because it provides higher speed data transmission. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to implement the peak power reduction system of Hunton in the GSM EDGE communication system of Wright et al. to improve the performance of the system.

Allowable Subject Matter

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8. Claims 6-7 and 13-14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The present invention discloses a PAR reduction for EDGE clipper that the step of filtering comprises a step of multiplying the residual signal by a projection matrix of a spanned signal space of the at least one carrier. The step of filtering further defined to comprise a step of applying the residual signal for at least one carrier, a matrix function, a sampling function, a filtering function and an interpolation function. The closest prior art Hunton (US 7,095,798 B2) and Wright et al. (US 7,061,990 B2) show a similar system but fail to disclose the filtering step comprises multiplying the residual signal by a projection matrix of a spanned signal space of the at least one carrier and further defined to comprise a step of applying the residual signal for at least one carrier, a matrix function, a sampling function, a filtering function and an interpolation function. The distinct features have been added to the independent claims 6-7 and 13-14, therefore, rendering them allowable.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Siu M. Lee whose telephone number is (571) 270-1083. The examiner can normally be reached on Mon-Fri, 7:30-4:00 with every other Friday off.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh Fan can be reached on (571) 272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Siu M Lee
Examiner
Art Unit 2611
7/30/2007


CHIEH M. FAN
SUPERVISORY PATENT EXAMINER